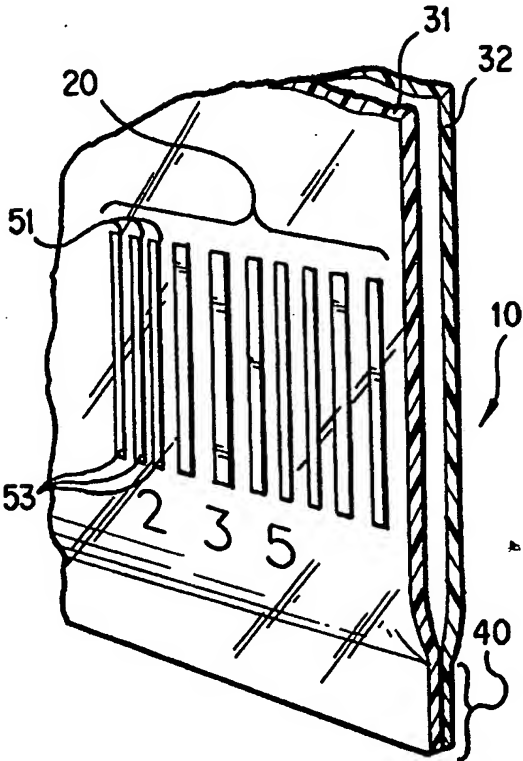


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| <p>(51) International Patent Classification ⁶ : G06K 1/12, 19/06</p> | <p>A1</p> | <p>(11) International Publication Number: WO 99/49408 (43) International Publication Date: 30 September 1999 (30.09.99)</p> |
| <p>(21) International Application Number: PCT/US99/05614 (22) International Filing Date: 17 March 1999 (17.03.99) (30) Priority Data: 09/048,401 25 March 1998 (25.03.98) US (71) Applicant: ABBOTT LABORATORIES [US/US]; CHAD-0377/AP6D-2, 100 Abbott Park Road, Abbott Park, IL 60064-6050 (US). (72) Inventors: BUINEVICIUS, Algimantas, L.; 11580 W. 123rd Street, Palos Park, IL 60464 (US). PFEIFFER, William, M.; 48 Wagner Drive, Cary, IL 60013 (US). (74) Agents: WOODWORTH, Brian, R. et al.; Abbott Laboratories, CHAD 0377/AP6D-2, 100 Abbott Park Road, Abbott Park, IL 60064-6050 (US).</p> | | <p>(81) Designated States: AU, CA, JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> |
| <p>(54) Title: BAR CODING SYSTEM</p> <p>(57) Abstract</p> <p>Flexible packaging (31, 32) is provided with a bar code (20). A method is provided for applying the bar code (20) to flexible packaging material (31, 32). An opaque coating of reflective color is applied on a surface of the material in a bar code pattern in which non-reflective bars (51) are defined by uncoated strips of the transparent material and in which reflective spaces (53) between the bars are defined by the opaque coating.</p>  | | |

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BAR CODING SYSTEM**CROSS REFERENCE TO RELATED APPLICATION(S)**

Not Applicable

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**STATEMENT REGARDING
FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT**

Not Applicable

10

REFERENCE TO A MICROFICHE APPENDIX

Not Applicable

TECHNICAL FIELD

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The present invention relates to packaging material with a bar code and to a method for providing such material with a bar code. The invention is especially suitable for flexible, thermoplastic containers of liquid products used in medical procedures.

20

**BACKGROUND OF THE INVENTION AND
TECHNICAL PROBLEMS POSED BY THE PRIOR ART**

Various foodstuffs, liquids, and other substances can be sterilely packaged in pouch-type flexible containers made from webs of flexible film, sheet stock, or the like material which is sealed together along the peripheral edges. There are a number of advantages to these pouch-type flexible containers, including low weight, durability, and low cost fabrication.

25

Various medical solutions are sterilely packaged in pouch-type flexible containers. The medical solutions can be pharmaceutical and/or nutritional products intended for parenteral or enteral delivery. Such solutions can be delivered to a patient through an administration tubing set connected with

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the flexible container. The container may include one or more access tubes or fittings through which the liquid is pumped to initially fill the container during manufacture of the package and to which the administration set may be connected for delivering the liquid to the patient.

5 The use of bar coding to identify the contents of a container is widespread in the medical industry. For example, bar codes allow a hospital pharmacy to track its inventory of certain pharmaceutical products using a bar code reader and an electronic inventory control system. Hospital
10 accounting departments typically use bar codes for the purpose of billing patients for medical products used during their hospital stays.

 In the past, bar codes have been applied to flexible, transparent, medical containers using a two-step process. First, the container is passed through a printing machine that applies a background field for the bar code. The specific color and size of this background field will vary depending upon
15 the particular bar coding system being used. Next, the container is passed through a second printing machine which applies the bar code over the top of the background field.

 The present invention provides an improved identification system which can be applied to packages in a single pass through a printing
20 machine, thereby reducing the cost of production of the package.

SUMMARY OF THE INVENTION

 The present invention provides a novel identification system for
25 packaging material. The system provides an identification code on a flexible packaging material, such as a container for a liquid product, in a single pass of the packaging material through a printing machine.

 The identification system can be used in production control during manufacture of the package, or, in some cases, can be used to apply the
30 identification code to the product after the package has been filled. The

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identification system may also be used in inventory control, both in the manufacturing process and in the hospital or other medical facility.

One aspect of the invention provides a bar-coded material for flexible packaging, including flexible containers and the like. The bar-coded material comprises a web of packaging material that is flexible and transparent.

The bar-coded material also includes an opaque coating of a reflective color which is applied to a surface of the material in a bar code pattern. Non-reflective bars are defined by uncoated regions of the flexible, transparent material, and reflective spaces between the bars are defined by the opaque coating on the flexible, transparent material.

Another aspect of the invention includes a method or process for providing a bar-coded material for flexible packaging, including flexible containers and the like. One step of the method includes providing at least a first web of a packaging material that is flexible and transparent. Another step of the method includes the application of an opaque coating having a reflective color to a surface of the first web of the transparent material. The coating is applied in a bar code pattern in which non-reflective bars are defined by uncoated strip regions of the first web of transparent material and in which reflective spaces between the bars are defined by the opaque coating.

According to a preferred embodiment of the method, the opaque coating may be conveniently applied with a heated, metal, stamp die operating to hot-stamp a polyester carrier against the first web of material. A surface of the polyester carrier has a white film, and the white film contacts a surface of the first web to leave a deposit of the white film on the first web surface so as to define the coating of the bar code pattern.

Numerous other advantages and features of the present invention will become readily apparent from the following detailed description of the invention, from the claims, and from the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings that form part of the specification, and in which like numerals are employed to designate like parts throughout the same,

5 FIG. 1 is a fragmentary, perspective view of bar-coded material defining part of an empty, flexible container prior to the container being filled with a liquid product to complete the manufacture of a package;

10 FIG. 2 is simplified, fragmentary, side elevational view illustrating the method of the present invention, and the thicknesses of some of the components relative to the thicknesses of other components illustrated in FIG. 2 are enlarged out of scale for ease of illustration; and

 FIG. 3 is a fragmentary, plan view taken generally along the plane 3-3 in FIG. 2.

15 DESCRIPTION OF THE PREFERRED EMBODIMENT

While this invention is susceptible of embodiment in many different forms, this specification and the accompanying drawings disclose only some specific forms as examples of the invention. The invention is not intended to
20 be limited to the embodiments so described, however. The scope of the invention is pointed out in the appended claims.

For ease of description, the material of this invention and the method of this invention are described in one or more selected orientations, and terms such as upper, lower, horizontal, etc., are used with reference to these
25 orientations. It will be understood, however, that the method of this invention may be practiced in orientations other than those described.

FIG. 1 illustrates an empty, flexible solution container or primary
30 container 10 which incorporates the bar-coded, flexible packaging material of the present invention. The bar code is designated generally by the reference numeral 20. The bar code 20 is on a first web 31 of a packaging material

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which preferably defines a back wall or rear wall of the empty container 10. The container 10 includes a second web 32 of material defining a front wall of the container 10. It will be appreciated that first web 31 and second web 32 can be formed from a single piece of a stock web material or from multiple
5 pieces of the stock web material without departing from the scope of the present invention. The characterization of one of the webs as a first web or rear wall and one of the webs as a second web or front wall is a matter of choice. The bar code 20 also can be located on the second web or front wall.

The first web 31 of material is preferably formed from a flexible,
10 transparent, thermoplastic polymer, such as polyvinylchloride. The second web 32 would typically be the same material, although that is not necessary. Although the material of the preferred embodiment of the present invention is transparent, it is to be appreciated that non-transparent materials may be used in connection with the system of the present invention. Any material
15 which, when filled with a liquid, is substantially non-reflective to incident light used in connection with bar code readings systems of known construction, can be used in connection with the present invention.

In one presently contemplated commercial embodiment, the first web 31 of material is radio frequency welded around the perimeter to the second
20 web 32 to define a heat-seal 40 prior to the bar code 20 being applied.

Each web 31 and 32 may be a single layer film or sheet stock. Alternatively, each web 31 and 32 or may be a multi-layer film, such as, for example, an extrusion-laminated film or an adhesive-laminated film. Such a laminated film may have a first bondable surface layer (e.g., a gas barrier
25 layer), a thermal stability layer, appropriate bonding layers, and an outer surface layer. If a multi-layer film is used, it is presently preferred that the outer surface layer be polyvinylchloride.

The container 10 typically includes one or more access tubes or fittings (not illustrated) extending through one of the walls or webs 31 and 32. Such
30 access tubes or fittings are typically radio frequency-welded to the container

wall in a leak-tight manner to provide for access between the interior of the container and the exterior of the container. The container 10 is initially filled with a liquid product through one of the tubes or fittings.

Subsequently, the liquid product can be discharged from the container 10 through the same tube or fitting, through a different tube or fitting, or through another opening subsequently formed in container 10. Any suitable conventional or special design may be employed for the construction of the container webs or walls 31 and 32 and for the construction of the container 10 per se, including the attachment of appropriate access tubes or fittings.

The details of such a design form no part of the present invention.

In many applications, it is desirable that the container 10 be transparent, or that at least one of the walls or webs 31 or 32 be transparent. This permits observation of the liquid product packaged in the container 10. During the process of administering the liquid product to a patient, the amount of liquid product remaining in the container 10 can be readily observed.

The bar code 20 includes an opaque coating of a reflective color on the exterior surface of the material defining the web 31. Preferably, the coating is applied to the exterior surface of the container 10, and the coating is preferably white. It will be appreciated that other reflective colors can be used without departing from the intended spirit and scope of the present invention.

The coating defines a bar-code pattern having coated and uncoated areas. Non-reflective bars 51 are defined by uncoated areas which permit web 31 to be viewed therethrough. Reflective spaces 53 between the bars 51 are defined by the opaque coating. The resulting bar code pattern appears to a known bar code reader as a standard bar code and thus is readable by such bar code readers. However, the bar code of the present invention is distinguished from prior bar codes in that the bar code of the present invention only provides the reflective areas of the bar code. The non-

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reflective areas are provided by the underlying web material. Thus, the bar code of the present invention can be placed on the web material via a single pass technique rather than requiring the application of two separate layers.

5 In a preferred embodiment, the bar code 20 is of the type designated as NDC 128 under the Health Industry Bar Code (HIBC) standard. The bar code is employed to designate Arabic numerals 1-9 and 0. Preferably, the Arabic numerals per se are also printed below the bar code 20 with the same opaque coating, thereby permitting the bar code pattern to be read by a computer and by a human. In FIGS. 1 and 3, the bar code pattern has been
10 simplified for ease of illustration and does not necessarily correspond to the illustrated numerals 2, 3, and 5.

In the preferred process for applying the coating, the coating is applied to the container 10 after the container has been fabricated, but prior to filling the container 10 with a liquid product. However, the present invention does
15 not exclude the possibility of applying the coating to a surface of a web of packaging material (prior to that web being formed into a container (with or without additional webs of material). Nor does the present invention exclude the possibility of applying the coating to a surface of a web of packaging material after it has been filled with a liquid product.

20 FIG. 2 illustrates a preferred form of the method of the present invention for providing a bar-coded material for flexible packaging. In the preferred form of the method, the material is part of the empty container 10 which has been fabricated from webs 31 and 32 of flexible, transparent material, such as film, sheet stock, or the like. In FIG. 2, the container 10 is
25 viewed from an edge, and the first web 31 is on the bottom, and the second web 32 is on the top. The webs 31 and 32 have been welded or sealed together, typically by radio frequency welding, about peripheral portions to define the seal 40.

Typically, the webs 31 and 32 are provided as continuous, long sheets
30 from large spools or rolls of material. The material is indexed along a

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processing line as various operations are performed on the webs 31 and 32. Separate supply rolls may be used for the webs 31 and 32, or, alternatively, one supply roll may be employed with the single sheet of material being folded over to form the front and back walls of the container (such as defined by the webs 31 and 32 illustrated in FIG. 2). In another alternative embodiment, webs 31 and 32 may be defined by a single, tubular length of material.

During fabrication of the containers 10, one or more access tubes, port assemblies, or fittings (not illustrated) are typically sealingly attached to the webs. Liquid product can be subsequently pumped through such fittings to fill the individual containers 10. Subsequently, the fittings are sealed or otherwise closed. The individual, filled containers are then severed from the continuous web or webs of material. Any suitable, conventional or special container fabrication system may be employed.

In order to provide the bar-coded material in accordance with the present invention, a coating application station is preferably defined along the container fabrication line. Preferably, the coating application station is located along the container fabrication line downstream of the point at which the container peripheral seal 40 has been formed between the two webs 31 and 32, but upstream of the location where the container 10 is filled with liquid product.

As shown in FIG. 2, the coating application station includes a heated, metal stamp die 60. The die 60 has raised areas 62 which define the bar code pattern of reflective spaces 53 (FIG. 1). Further, in a preferred embodiment, the metal stamp die 60 includes additional raised areas 64 defining Arabic numerals adjacent portions of the raised area 62. The Arabic numerals defined by the raised areas 64 have a reverse orientation on the surface of the stamp die 60.

The stamp die 60 is adapted to be extended and retracted toward and away from the webs 31 and 32, respectively, as indicated by the

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double-headed arrow 68 in FIG. 2. The stamp die 60 is also provided with means for heating at least the outer surface region of the die 60 containing the raised areas 62 and 64. The means for extending and retracting the die 60, along with the means for heating the die 60, may be of any suitable conventional or special design, the details of which form no part of the present invention.

A web or carrier 72 is disposed between the container first web 31 and the die 60. The carrier 72 is typically supplied from a roll or spool (not shown). The carrier 72 is a ribbon-like material having one side or surface covered with a transfer film 76. In a preferred embodiment, the carrier 72 is a polyester web having a thickness of about 12 microns, and the film 76 is a white pigment. It will be appreciated that other pigment colors can be used without departing from the spirit and scope of the present invention.

Typically, the carrier 72 is unwound from a spool adjacent the die 60. The carrier 72 is indexed for incremental movement with the container webs 31 and 32.

Any suitable conventional or special carrier 72 may be employed. One conventional carrier 72 that might be used is sold in the United States of America by Coating Products, Inc. under product number RK8-78B. The white film or pigment layer 76 on the carrier 72 preferably is approved by the Federal Drug Administration of the United States of America.

An anvil or backing member 80 is provided adjacent the exterior surface of the container second web 32. The anvil 80 functions to support the container 10 as the stamp die 60 is extended to force the carrier 72 against the container 10. The stamp die 60 forces the carrier film 76 against the exterior surface of the back wall or first web 31 of the container 10. This urges the carrier 10 towards the anvil 80 until the exterior surface of the front wall or second web 32 of the container 10 is forced against the anvil 80.

The hot stamp die 60 is moved with sufficient force against the carrier 72 to squeeze the carrier 72, first web 31, and second web 32 together

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between the die 60 and the anvil 80. The temperature and pressure of the stamp die 60 is sufficient to impress some of the white film 76 against the exterior surface of the container first web 31 so as to leave a deposit of the film on the container which defines the coating in the bar code pattern 20 (FIG. 1). Some of the carrier film 76 is also deposited on the container 10 so as to form the Arabic numerals 64 below the bar code 20.

Preferably, the container 10 and carrier 72 are squeezed together between the anvil 80 and the stamp die 60 with a compressive force ranging between about 250 pounds and about 350 pounds. Preferably, the stamp die 60 is maintained at a temperature ranging between about 260° F. and about 330° F.

In a presently preferred mode of operation, the container 10 and carrier 72 are squeezed between the anvil 80 and stamp die 60 for a period of time ranging between about 0.25 second and about 0.35 second.

The stamp die raised areas 62 which define the pattern of reflective spaces in the bar code have a total surface area of about 2.025 square inches in one presently contemplated commercial embodiment.

In the presently preferred embodiment, the coating stamped on the container 10 to define the reflective spaces 53 of the bar code pattern has a white color. However, other suitable, reflective colors could be employed.

Further, it will be appreciated that the bars 51 between the reflective, coated spaces 53 are generally non-reflective. Because the bars 51 are defined by the transparent material, such as the polyvinylchloride web material forming the container bar-coded wall, the bar code reader laser energy generally passes through the bars without significant reflection.

The liquid product within the container 10 is typically clear. However, it may be slightly tinted, or even dark colored, so long as it does not reflect the bar code reader laser energy.

It will be appreciated that the method of the present invention results in the production of a bar-coded material which, in the preferred form, is

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incorporated in an empty container which can be subsequently filled with liquid product. The method provides an inexpensive yet accurate way to identify flexible packaging, especially flexible containers for liquid products.

5 The bar code identification system may be utilized during the package fabrication process for quality control and/or inventory purposes. The application of bar codes to empty containers pursuant to a preferred form of the method of the present invention accommodates a quality control system which can be employed to avoid the introduction of the wrong liquid product into a particular container. This is especially useful in a manufacturing
10 facility wherein a variety of liquid products are packaged in the same type of container.

The provision of the bar code identification on the flexible package is especially useful in hospitals and other medical facilities for inventory control and for checking the proper administration of medication or other liquids to
15 patients.

It will be readily apparent from the foregoing detailed description of the invention and from the illustrations thereof that numerous variations and modifications may be effected without departing from the true spirit and scope of the novel concepts or principles of this invention.

WHAT IS CLAIMED IS:

1. A container comprising:
a web of packaging material; and
an opaque coating of a reflective color, said opaque coating disposed on a surface of said material in a bar code pattern, said bar code pattern defining coated and uncoated strip regions, said uncoated strip regions defining non-reflective regions and said coated regions defining reflective bars.
2. A container in accordance with Claim 1, wherein said packaging material has a first side intended to be an exterior surface of said container and an opposite side intended to be an interior surface of said packaging and wherein said opaque coating is on said exterior surface.
3. A container in accordance with Claim 1, wherein said reflective color is white.
4. A container in accordance with Claim 1, wherein said coating is applied as a transfer of at least a portion of a film from a polyester carrier.
5. A method for providing a bar-code on a packaging material, said method comprising the steps of:
providing a first web of a packaging material;
applying an opaque coating of a reflective color to a surface of said first web of packaging material in a bar code pattern, said bar code pattern defining coated and uncoated strip regions of said of said first web, said uncoated strip regions defining non-reflective regions and said coated regions defining reflective bars.

5 6. A method in accordance with Claim 5, wherein said first web is a web of thermoplastic polymer, and wherein said applying step includes the steps of (a) providing a polyester carrier having a side covered with a film, and (b) hot-stamping said polyester carrier against said first web with said film contacting a surface of said first web and leaving a deposit of said film on said first web surface to define said coating.

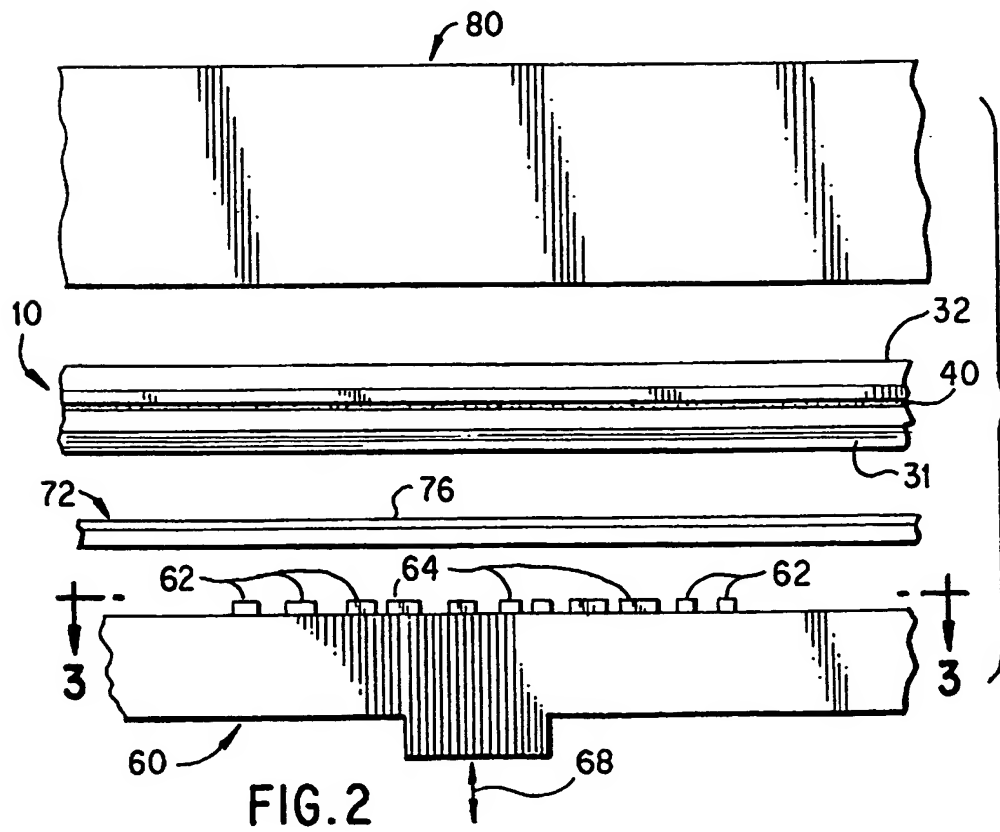
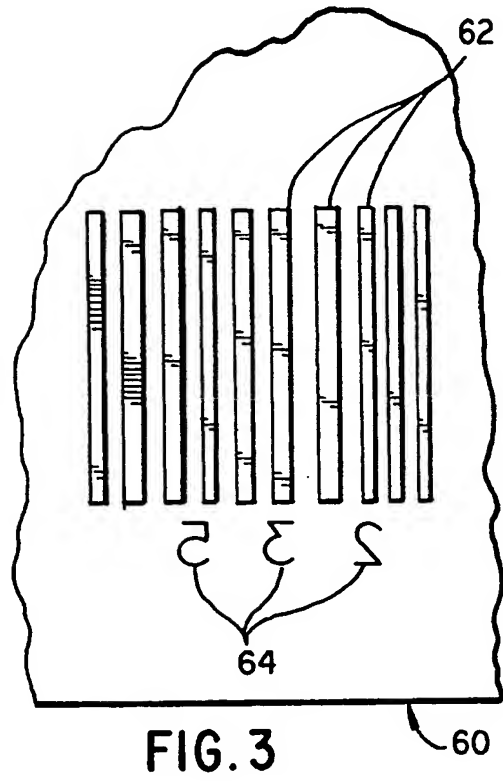
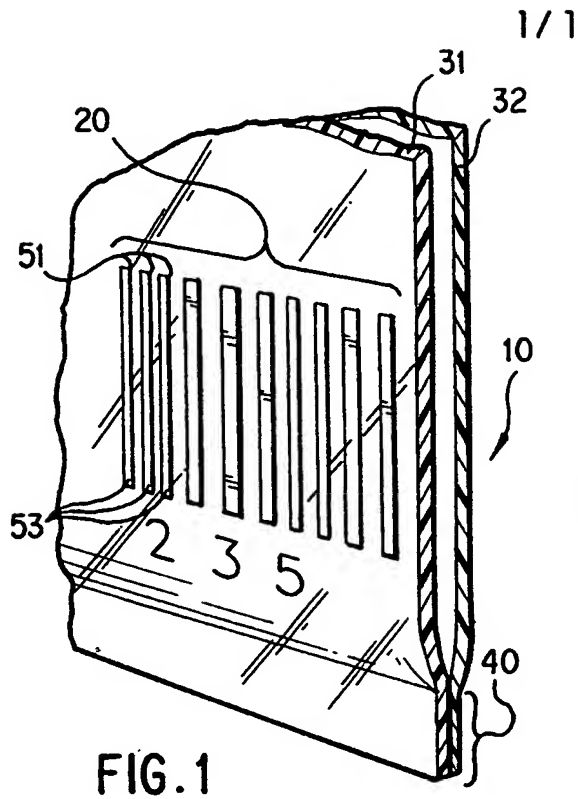
 7. A method for providing a bar-coded container, said method comprising the steps of:
 indexing a container along a processing line wherein said container includes (1) a first web of flexible material defining a wall of the
5 container, and (2) a second web of flexible material defining another wall of the container;

 providing a polyester carrier having a side covered with an opaque film and indexing said carrier adjacent said container along said processing line;

10 providing an anvil along said processing line adjacent said container second web;

 forcing said carrier opaque film against a surface of said first web by engaging said carrier with a heated metal stamp die which has a plurality of separated, raised areas; and

15 compressing said carrier and container between said die and an anvil to impress a portion of said opaque film against said first web surface in a pattern corresponding to said die raised areas and leave an opaque coating of said film on said first web surface to define a bar code wherein
20 non-reflective bars are defined by uncoated strip regions of said first web of transparent material and wherein reflective spaces between said bars are defined by said opaque coating.



INTERNATIONAL SEARCH REPORT

national Application No
PCT/US 99/05614

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 G06K1/12 G06K19/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G06K B07C B65D B65C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X | US 5 701 538 A (YASUI MOTOTADA) 23 December 1997 (1997-12-23) abstract column 2, line 15 - column 4, line 25 column 6, line 17 - column 8, line 55 figures 1,5,7 | 1-7 |
| X | EP 0 354 817 A (ESSELTE METO INT GMBH) 14 February 1990 (1990-02-14) abstract column 2, line 5 - column 3, line 32 figure 1 | 1-3,5 |
| A | GB 2 270 392 A (COLUMBIA RIBBON CARBON MFG) 9 March 1994 (1994-03-09) abstract page 3, line 24 - page 4, line 4 page 7, line 14 - page 8, line 23 | 4,6 |
| | --- -/-- | |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ² | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| A | <p>EP 0 408 896 A (LANDIS & GYR BETRIEBS AG) 23 January 1991 (1991-01-23) abstract column 2, line 15 - column 4, line 24 figure 1</p> <p>-----</p> | 7 |